NOM :

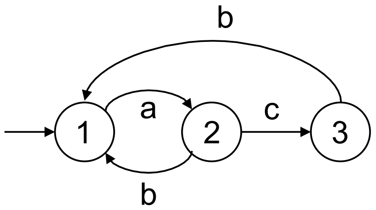
PRENOM :

UE Sciences de l'Information 1 - EC Modélisation des SED **Durée : 1h (documents non autorisés)** *Les réponses doivent être saisies sur le sujet.*

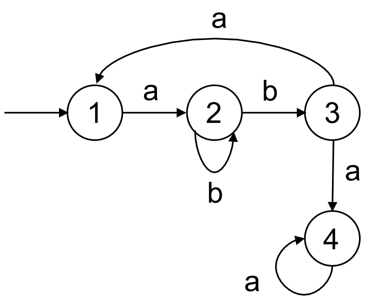
Question 1. *Donnez les automates reconnaissants les expressions régulières suivantes (LG : langage généré et LM : langage marqué)* (3 points)

		Points
LG = ε + (ab)*(ε + a + ac*) LM = (ab)*ac*		
LG = ε + a + abc* + bc* LM = abc* + bc*		

Question 2. *A l'aide du lemme d'Aden, déterminez quels sont les langages générés et marqués par l'automate suivant* (4 points)

<table>
<tr><th></th><th></th><th>Points</th></tr>
<tr><td>
</td><td>L1 =
L2 =
L3 =
Par substitution, on obtient
L1 =
Par application du lemme d'Arden, on obtient alors :
L1 =
L2 =
L3 =
d'où
Langage généré L_G =
Langage marqué L_M =</td><td></td></tr>
</table>

Question 3. *Déterminiser l'automate suivant* (4 points)

<table>
<tr><th></th><th></th><th>Points</th></tr>
<tr><td>
</td><td></td><td></td></tr>
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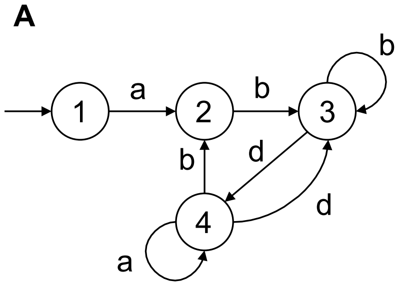
NOM :

PRENOM :

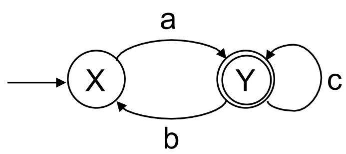
Question 4. *Calculer la composition synchrone entre les automates A et B.* (4 points)

Points

A



B



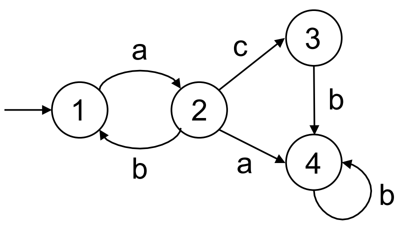
<u>A X B</u>

<u>A II B</u>

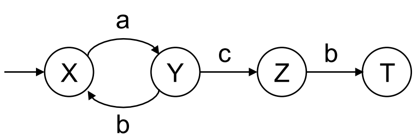
Question 5. *Soit b un événement incontrôlable, et a et c deux événements contrôlables. Appliquez l'algorithme de Kumar pour déterminer le superviseur maximal permissif pour le procédé G et la spécification K.* (5 points)

Points

G (Procédé)



K (spécification)



<u>G X K</u>

<u>Etat(s) interdit(s) :</u>

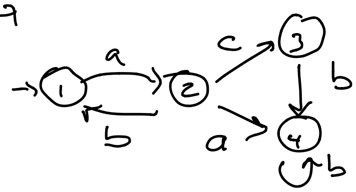
Justification :

<u>Etat(s) faiblement interdit(s) :</u>

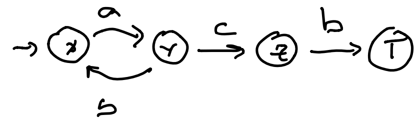
Justification :

<u>Automate générant le langage suprême contrôlable L(K/G)</u>

G



K



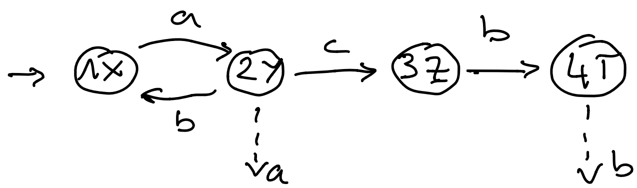
$\left\lbrace \begin{array}{l} b \in \Sigma_u' \\ a, c \in \Sigma_c \end{array} \right.$

1) $\varepsilon + (ab)^* (\varepsilon + a + ac + acb^* + aab^*)$

$\varepsilon + (ab)^* (\varepsilon + a + ac + acb) \underbrace{b}_{\Sigma_u}$

$acbb \left\lbrace \begin{array}{l} \in \bar{K}\Sigma_u \cap L_G \\ \notin \bar{K} \end{array} \right.$

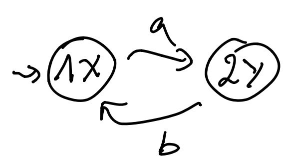
2)



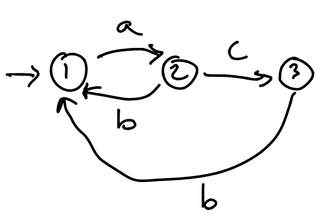
3) 4T état interdit $\left\lbrace \begin{array}{l} b \text{ admis ds } G \\ b \text{ interdit ds } K \\ b \in \Sigma_u \end{array} \right.$

3Z état faiblement interdit $\left\lbrace \begin{array}{l} 3Z \xrightarrow{b} 4T \\ b \in \Sigma_u \end{array} \right.$

4) Superviseur:



2



$\left\lbrace \begin{array}{l} L1 = \varepsilon + L2b + L3b \\ L2 = L1a \\ L3 = L2c \end{array} \right.$

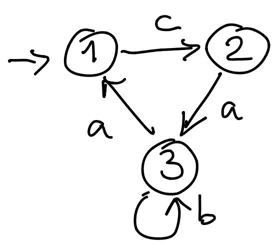
$$L1 = \varepsilon + L1ab + L1acb$$
$$= \varepsilon + L1(ab + acb)$$
$$L1 = (ab + acb)^*$$
$$L2 = (ab + acb)^* a$$

$$L3 = (ab + acb)^* ac$$

---

2 bis

$$\begin{cases} L1 = \varepsilon + L3\,a \\ L2 = L1\,c \\ L3 = L2\,a + L3\,b \end{cases}$$

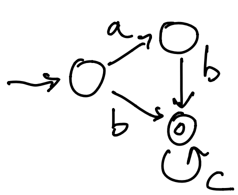


$$L3 = (\varepsilon + L3a)ca + L3b$$
$$= ca + L3\,aca + L3b$$
$$= ca + L3(aca + b)$$

$$L3 = ca(aca+b)^*$$
$$L1 = \varepsilon + ca(aca+b)^* a$$
$$L2 = c + ca(aca+b)^* ac$$

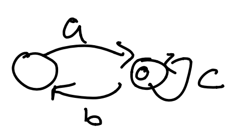
$$L = \varepsilon + c + ca(aca+b)^*(\varepsilon + a + ac)$$

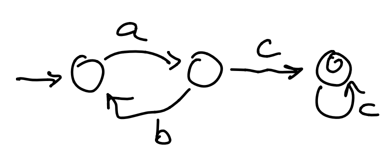
1



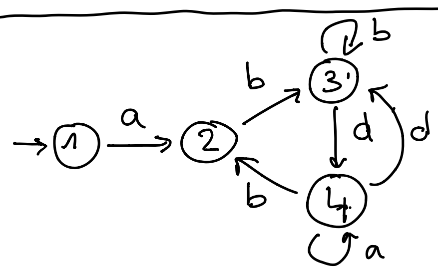
$$L_a = \varepsilon + a + abc^* + bc^*$$
$$L_n = abc^* + bc^*$$

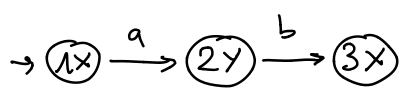
$$L_a = \varepsilon + (ab)^*(\varepsilon + a + ac^*)$$

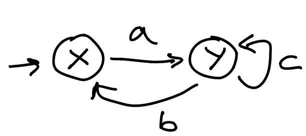


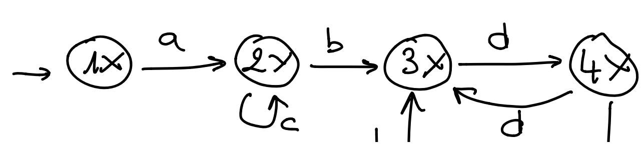


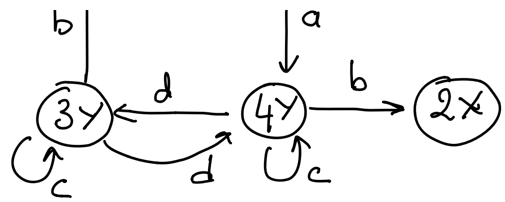
3



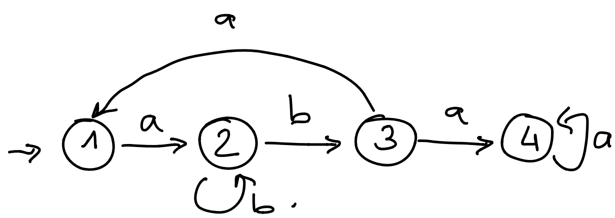


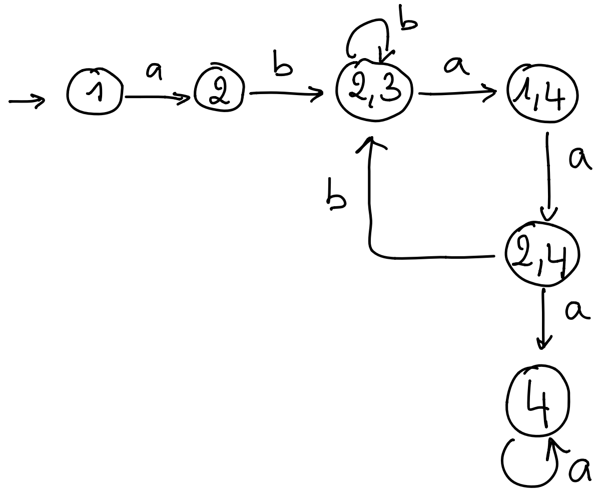






4





- $2 \xrightarrow{b} 2,3$

- $2,3 \xrightarrow{b} 2,3$
- $2,3 \xrightarrow{a} 1,4$

- $1,4 \xrightarrow{a} 2,4$

- $2,4 \xrightarrow{a} 4$
- $2,4 \xrightarrow{b} 2,3$

- $4 \xrightarrow{a} 4$